BETTER BURGERS: WHY IT'S HIGH TIME THE U.S. BEEF INDUSTRY KICKED ITS ANTIBIOTICS HABIT

FIGURE 1: FIVE STATES CONTAIN MORE THAN 70 PERCENT OF FEEDLOT BEEF CATTLE

Figure 1 illustrates the concentration of feedlots in the central United States. It is based on the following table, which summarizes data from the 2017 U.S. Agricultural Census on the number of feedlots and their collective cattle inventory in the top five cattle-producing states, in ranking order: Nebraska, Texas, Kansas, Iowa, and Colorado.

The top three states have slightly more than half the nation's entire inventory of cattle on feedlots, and the share of the top five states is 71 percent.

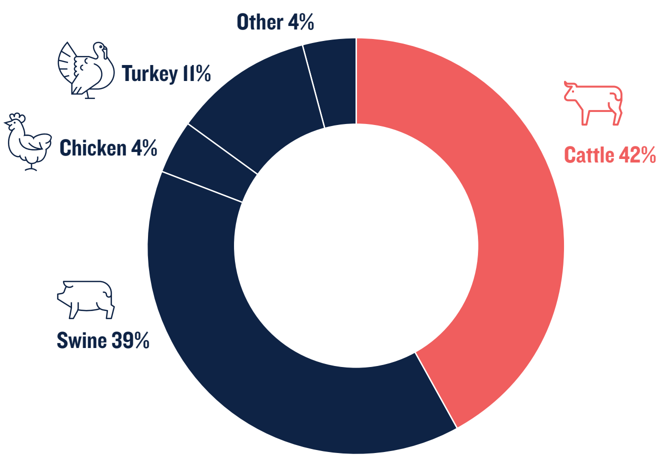
	Number of Feedlots	Number of Cattle	% of all U.S. cattle on feed	Avg. cattle per feedlot
Nebraska	1,737	2,910,262	19%	1,675
Texas	360	2,656,923	18%	7,380
Kansas	761	2,445,281	16%	3,213
Iowa	4,942	1,644,497	11%	332
Colorado	272	1,005,237	7%	3,696
U.S. inventory	25,776	15,025,052	100%	583
Top 3 states	2,858	8,012,466	53%	2,804
Top 5 states	6,335	10,662,200	71%	1,683

Source: U.S. Department of Agriculture, National Agricultural Statistics Service, *2017 Census of Agriculture*, chapter 2, table 11, "Cattle and Calves—Inventory and Sales: 2017 and 2012," page 404, April 2019, https://www.nass.usda.gov/Publications/AgCensus/2017/Full_Report/ Volume_1,_Chapter_1_US/usv1.pdf.

FIGURE 2: PERCENTAGE OF MEDICALLY IMPORTANT ANTIBIOTICS SOLD TO U.S. LIVESTOCK SECTOR, 2018

The U.S. Food and Drug Administration (FDA) has been reporting sales of medically important antibiotics for use in food animal production since 2009. It has provided estimates of sales by animal sector (cattle, swine, chicken, turkey) only since 2016.

Figure 2 is based on the latest estimates, released in December 2019. The accompanying table provides the raw data.



	Antibiotics sold (lbs.)	% of total
All Food Animals	13,307,411	100%
Cattle	5,558,200	42%
Swine	5,234,541	39%
Chicken	488,928	4%
Turkey	1,479,540	11%
Other (sheep, goats, ducks, etc.)	546,202	4%

Source: U.S. Food and Drug Administration, Center for Veterinary Medicine, *2018 Summary Report on Antimicrobials Sold or Distributed for Use in Food-Producing Animals*, December 2019, https://www.fda.gov/media/133411/download.

FIGURE 3: ANTIBIOTICS IN CATTLE FEED (2016) AND REASONS FOR THEIR USE

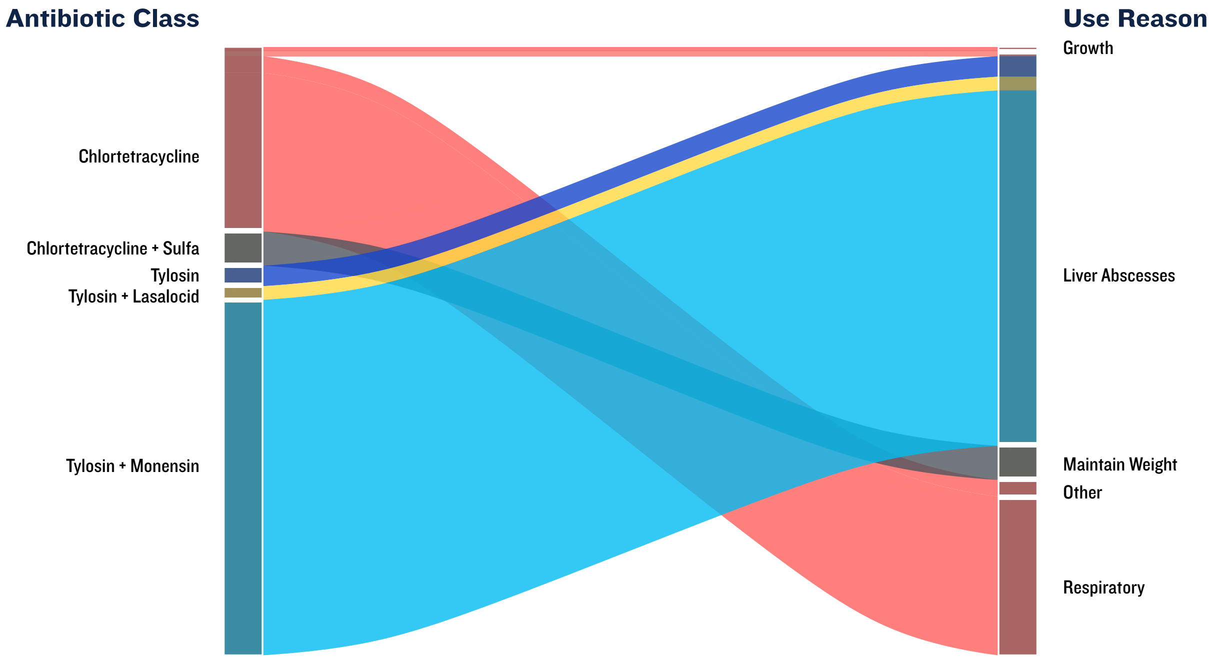


Figure 3 is based on analysis done by colleagues at the Food Animal Concerns Trust (FACT).[1] With FACT's permission, NRDC modified the original figure, focusing solely on medically important antibiotics that are added to cattle feed either singly or in combination with other, non–medically important drugs. Our figure, for instance, excludes ionophores, which are a common, non–medically important feed additive used for growth promotion and to prevent coccidiosis, a parasitic infection.

This analysis offers a more comprehensive understanding of how and why medically important antibiotics are being routinely fed to cattle herds on feedlots than is available from other sources, including the U.S. Department of Agriculture (USDA) and the FDA. Its most significant finding is that the large majority of medically important antibiotics are fed to feedlot herds to "prevent" (or reduce the incidence of) liver abscesses or to address the risks from respiratory disease (shipping fever), even though both problems can be effectively lessened or prevented altogether through improved diet and better cattle management practices.

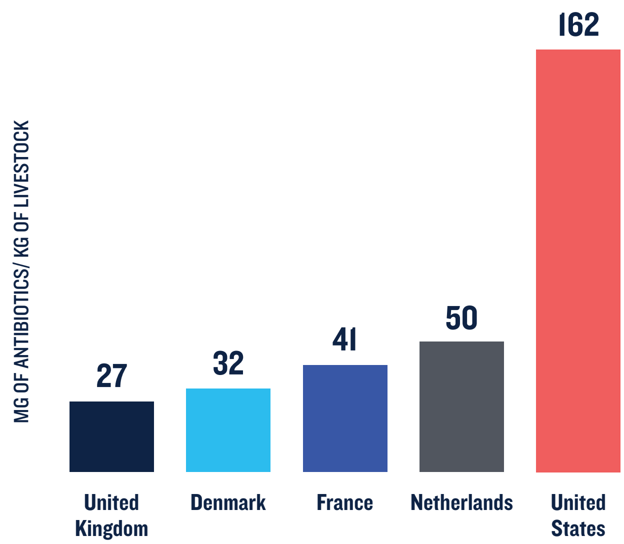
Figure 3 is complex. The five colored segments on the left-hand vertical bar represent the five feed products that were given to at least 1 percent of cattle on surveyed feedlots, according to the USDA Animal and Plant Health Inspection Service's (APHIS) report *Antimicrobial Use and Stewardship on U.S. Feedlots, 2017*. These are feed products containing antibiotics from the medically important macrolide or tetracycline classes, either alone or in combination with other medically important (sulfa) or non–medically important drugs (lasalocid, monensin).[2] The height of each vertical bar segment is proportional to the use of the corresponding feed product: Tylosin plus monensin, for example, is used far more than chlortetracycline plus sulfa, tylosin, or tylosin plus lasalocid.

The height of the five segments on the right-hand vertical bar, according to FACT's analysis, represent the relative proportions of the five chief reasons these antibiotic-containing products are added to cattle feed (growth, liver abscesses, maintain weight, other, and respiratory). Reasons of use are broken out only for products used in at least 5 percent of cattle for at least one listed drug; all other reasons of use were included in the "other" category.

Last year's aforementioned USDA report, for example, summarizes feedlot operators' responses to a survey conducted in 2016 that asked about the number of cattle on feedlots receiving chlortetracycline in their feed (at least 26 percent) and the specific reason for that use (nearly 86 percent indicated that it was to "prevent, control, or treat respiratory disease").[2] The same survey failed to report on the reason for use for the other four feed products containing medically important antibiotics, citing supposed confidentiality concerns that were not explicated.[3]

However, FACT was able to extrapolate the primary reasons of use for these four other products from information in the Code of Federal Regulations, or CFR.[4] For the sake of clarity, FACT has combined into a single "liver abscesses" category all feed products for which the CFR lists "liver abscess prevention" alone, "liver abscess prevention combined with coccidiosis prevention," and "liver abscess prevention combined with growth promotion" or "reduction of incidence of liver abscesses." The latter reason of use is considered equivalent to disease prevention because it also is a routine use and is not based on any diagnosis of illness.

FIGURE 4: INTENSITY OF ANTIBIOTIC CONSUMPTION IN CATTLE PRODUCTION IN THE UNITED STATES (2018) VERSUS THE UNITED KINGDOM, DENMARK, FRANCE, AND THE NETHERLANDS (2017)



Beef industries vary in size and makeup from country to country. A fair comparison of their antibiotic use requires an appropriate metric. Figure 4 derives from a metric and methodology first developed by the European Medicines Agency (EMA) and then used extensively by the EMA and Public Health Canada.[5] The metric's numerator is antibiotic sales (in milligrams of antibiotic active ingredient) and is adjusted by a calculated denominator representing the total kilograms of cattle produced.

The FDA has failed to perform its own calculations using this transparent, well-tested methodology thus far, despite the requisite data being available.

Country	Antibiotics in cattle production, adjusted by total cattle weight (mg/kg)	Factor by which U.S. use exceeds that in in this country
United States	162	
United Kingdom	27	6.0
Denmark	32	5.1
France	41	4.0
Netherlands	50	3.2

Method: Our calculations for the United States used recently available data for 2018 on antibiotic sales from the FDA and on cattle inventories, imports, and exports from the USDA.[6]

The European Medicine Agency's ESVAC (European Surveillance of Veterinary Antimicrobial Consumption) project currently tracks data on mg/kg antibiotic consumption and use in livestock production for 31 European countries and uses those data to issue annual reports.[7] The annual ESVAC reports specifically include the calculated weight in kilograms of cattle produced in each country, including the United Kingdom, Denmark, France, and the Netherlands. However, data on antibiotic sales for cattle production specifically can only be obtained from the 2017 reports of the FDA-equivalent agencies in those four countries.[8] Figure 4 therefore compares 2018 mg/kg calculations for U.S. cattle production with 2017 calculations for cattle production in France, the United Kingdom, the Netherlands, and Denmark.

In recent years, the rate or intensity at which antibiotics are consumed by the cattle industries in the four European countries has continued downward. As 2018 antibiotic use data for those countries become available, the contrast with the United States in terms of intensity of antibiotic use is likely to appear even more stark, because Figure 4 credits U.S. cattle production with an additional year of reductions in antibiotic use relative to its European counterparts.

ENDNOTES

1 Food Animal Concerns Trust, "For Consumers: The Future of Antibiotics Begins With Food," September 2019, https://foodanimalconcernstrust.org/antibiotics.

2 Animal and Plant Health Inspection Service (hereinafter APHIS), "Antimicrobial Use and Stewardship on U.S. Feedlots, 2017," May 2019, https://www.aphis.usda.gov/aphis/ ourfocus/animalhealth/monitoring-and-surveillance/nahms/antimicrobial_use_2017.

3 Ibid. The four feed additives referred to are those containing chlortetracycline plus sulfa, tylosin alone, tylosin plus monensin (an ionophore), and tylosin plus lasalocid (an ionophore).

4 Electronic Code of Federal Regulations, Title 21, https://www.accessdata.fda.gov/scripts/cdrh/ cfdocs/cfcfr/CFRSearch.cfm?fr=510.110 (accessed February 28, 2020)

5 The measure divides the total sales of antibiotics, in milligrams of active ingredient, by a calculated amount in kilograms representing the weight of all animals at the time(s) they are most likely to receive antibiotics. The European Medicines Agency describes this as the "population correction unit," or PCU, and refers to the overall metric as milligrams of antibiotic per PCU. See: European Medicines Agency (hereinafter EMA), *Trends in the Sales of Veterinary Antimicrobial Agents in Nine European Countries (2005–2009)*, Appendix 2, September 2011, http://www.ema.europa.eu/docs/en_GB/document library/Report/2011/09/WC500112309.pdf.

6 U.S. Food and Drug Administration, Center for Veterinary Medicine, *2018 Summary Report on Antimicrobials Sold or Distributed for Use in Food-Producing Animals*, December 2019, https://www.fda.gov/media/133411/download. The USDA data used to calculate kilograms of livestock for the United States in 2018, and the sources for those data, are summarized in the 2019 updated Appendix to David Wallinga, "Antibiotic Consumption in U.S. Pork, Beef, and Turkey Industries Vastly Outstrips Comparable Industries in Europe, and the U.S. Chicken Industry," February 4, 2020, https://www.nrdc.org/resources/antibiotic-consumption-us-pork-beef-and-turkey-industries-vastly-outstrips-comparable.

7 European Medicines Agency, European Surveillance of Veterinary Antimicrobial Consumption, *Sales of Veterinary Antimicrobial Agents in 31 European Countries in 2017*, October 15, 2019, https://www.ema.europa.eu/en/documents/report/sales-veterinary-antimicrobial-agents-31-european-countries-2017_en.pdf.

8 Veterinary Medicines Directorate, *UK Veterinary Antibiotic Resistance and Sales Surveillance Report (*UK-VARSS, 2017), October 2018, https://assets.publishing.service.gov.uk/ government/uploads/ system/uploads/attachment_data/file/837176/PCDOCS-_1692017-v1-VARSS_2017_Report_-_Watermarked.pdf. Danish Integrated Antimicrobial Resistance Monitoring and Research Program, *DANMAP 2017: Use of Antimicrobial Agents and Occurrence of Antimicrobial Resistance in Bacteria From Food Animals, Food and Humans in Denmark*, October 2018, https://www.danmap.org/-/media/arkiv/projekt-sites/danmap/ danmap-reports/ danmap_2017_rapport_230519_low.pdf?la=en. French Agency for Food, Environmental, and Occupational Health and Safety (ANSES), French Agency for Veterinary Medicinal Products, *Sales Survey of Veterinary Medicinal Products Containing Antimicrobials in France in 2017*, November 2018, https://www.anses.fr/en/system/files/ANMV-Ra-Antibiotiques2017EN.pdf. Netherlands Veterinary Medicines Institute, *Usage of Antibiotics in Agricultural Livestock in the Netherlands in 2017*, September 2018, https://cdn.i-pulse.nl/autoriteitdiergeneesmiddelen/ userfiles/Publications/engels-def-rapportage-2017.pdf.